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Exploring Trends : A Data Analyst's Portfolio

Sujata Singh

Department of Computer Application, G. H. Raisoni University, Amravati, Maharashtra, India

ABSTRACT

In today's data-driven world, the ability to extract actionable insights from complex datasets is paramount. The "Exploring Trends" project showcases a comprehensive analysis of [specific dataset], utilizing advanced data wrangling, statistical modeling, and visualization techniques to uncover underlying patterns and trends.

KEYWORDS: *MySql (Data extraction, data cleaning)*

I. INTRODUCTION

In today's data-driven world, businesses rely on powerful tools and techniques to extract valuable insights from large datasets to make informed decisions. This portfolio project have been to showcase my skills and proficiency in data analysis using Power BI for interactive visualizations and MySQLfor data management and querying.

This portfolio includes a series of projects where I demonstrate my ability to connect, clean, and analyze data from different sources, perform advanced querying in MySQL, and create dynamic reports and dashboards in Power BI that provide actionable insights for business stakeholders.

Key Skills Demonstrated:

1. Data Extraction and Transformation with MySQL: Using MySQL to write complex queries for data extraction, transformation, and manipulation.
2. Data Cleaning and Preparation: Handling missing data, formatting issues, and preparing datasets for analysis.
3. Data Visualization with Power BI: Designing insightful, interactive dashboards and visualizations that help decision-makers understand trends and patterns.
4. Data Analysis and Insights: Applying statistical methods and analytical techniques to derive actionable business insights.
5. Reporting and Storytelling: Creating clear and concise reports that effectively communicate findings and recommendations.

Units:

- **Number of Users**: Quantify the total users interacting with the portal.
- **Session Duration**: Measure the average time (in minutes or seconds) users spend per session.
- **Page Views**: Count the average number of pages viewed per session.
- **Bounce Rate**: Expressed as a percentage, this indicates the proportion of users who leave the portal after viewing only one page.
- **Response Time**: Average time (in milliseconds or seconds) the system takes to respond to user actions.
- **Response Rate**: Percentage of participants who complete the survey out of those invited.
- **Drop-off Rate**: Percentage of participants who start but do not complete the survey.
- **Average Response Time**: Mean time (in minutes or seconds) taken by participants to complete the survey.

II. RELATED WORK

1. Interactive Dashboards for Trend Visualization

Colin Ryan Subido's portfolio showcases several projects utilizing tools like Power BI and Tableau to analyze and visualize trends. For instance, his "London Bicycle Rides" project analyzes trends in bicycle usage over time, providing insights into urban mobility patterns. Such interactive dashboards allow stakeholders to explore data dynamically, facilitating informed decision-making

2. Comprehensive Data Lifecycle Projects

Zaleha Ali's capstone project emphasizes the five stages of the data lifecycle: importing, structuring, preparing, visualizing, and communicating data. By applying these stages to datasets like the Fortune Global 500, the project demonstrates a structured approach to trend analysis, ensuring that insights are both accurate and actionable.

3. Real-World E-commerce Trend Analysis

Discussions on platforms like Reddit highlight the development of end-to-end dashboards for e-commerce platforms such as Amazon and Shopify. These dashboards analyze monthly sales data, providing insights into seller performance and market trends. Such projects underscore the importance of real-time data integration and the need for scalable solutions in trend analysis.

4. Sentiment Analysis in Trend Prediction

Research by Joshi et al. explores the impact of news sentiment on stock market trends. By classifying news articles as positive or negative, the study predicts stock movements, highlighting the role of external factors in trend analysis.

5. Advanced Analytical Frameworks

Dhanya Jothimani and colleagues propose a big data analytical framework for portfolio optimization, incorporating structured and unstructured data. This approach enhances trend analysis by integrating diverse data sources, leading to more robust insights.

- **Interactive Visualizations**: Utilizing tools like Power BI and Tableau to create dynamic dashboards enhances user engagement and facilitates deeper insights.
- **Structured Data Lifecycle**: Adopting a comprehensive approach to data handling ensures that all aspects of trend analysis are thoroughly addressed.
- **Real-Time Data Integration**: Incorporating real-time data sources allows for up-to-date trend analysis, crucial in fast-paced industries.

- **Sentiment Analysis**: Considering external factors such as news sentiment can provide a holistic view of trends and their drivers.
- **Diverse Data Sources**: Integrating various data types enriches the analysis, leading to more nuanced insights.

III. DATA AND SOURCES OF DATA

The primary dataset used for this project was obtained from publicly available sources such as the **Kaggle Google Trends, World Bank Open data, Open Ml** and other open government platforms that provide real-time trends. These datasets typically include information such as the type of trend, places (latitude and longitude), and it's description. The data was cleaned and preprocessed using Data extraction and data cleaning

The project was developed using the MySql.

IV. RESEARCH METHODOLOGY

1. Data Collection: Extract marketing data from CRM, social media, email campaigns, and web analytics.
2. Data Cleaning: Remove duplicates, handle missing values, and standardize data using SQL.
3. Data Analysis: Perform SQL queries to analyze key metrics like conversion rates and customer engagement.
4. Performance Evaluation: Assess campaign success and compare different marketing channels.
5. Data Visualization & Reporting: Use Tableau/Power BI to present insights and provide recommendations.

Implementation Plan with Modules
Implementation Plan

1. Project Planning and Preparation

Tasks:
- Define the project scope and objectives.
- Set up MySQL database and Power BI environment.

Deliverables:
- Project plan and timeline.
- MySQL and Power BI setup completed.

2. Data Collection and Preparation

Tasks:
- Extract data from MySQL (SQL queries).
- Clean and transform data in Power BI using Power Query.
- Integrate and model data in Power BI.

Deliverables:
- Cleaned and transformed data model.

3. Exploratory Data Analysis (EDA)*

Tasks:
- Calculate summary statistics and basic visualizations.
- Perform initial data exploration to identify patterns.

Deliverables:
- Visual insights and key findings.

4. Advanced Data Analysis

Tasks:
- Write complex SQL queries for deeper insights.
- Use DAX in Power BI for calculations (e.g., KPIs, forecasts).
- Optional: Implement predictive analytics.

Deliverables:
- Advanced metrics and analysis (e.g., KPIs, predictions).

5. Data Visualization and Reporting

Tasks:
- Design interactive Power BI dashboards with key visuals.
- Use slicers, filters, and drill-through features for interactivity.

Deliverables:
- Interactive Power BI dashboards and reports.

6. Review and Refinement

Tasks:
- Validate data analysis and ensure accuracy.
- Refine visualizations based on feedback.
- Optimize Power BI performance.
- Deliverables:
- Polished, refined dashboards.

7. Documentation and Presentation

Tasks:
- Write project documentation and explain methodologies.
- Prepare a presentation summarizing key findings and insights.

Deliverables:
- Project documentation and presentation materials.

8. Final Portfolio Deployment

Tasks:
- Export Power BI reports and host portfolio online.
- Share project link for potential employers or community feedback.

Deliverables:
- Publicly available portfolio with interactive reports.

Figures and Tables

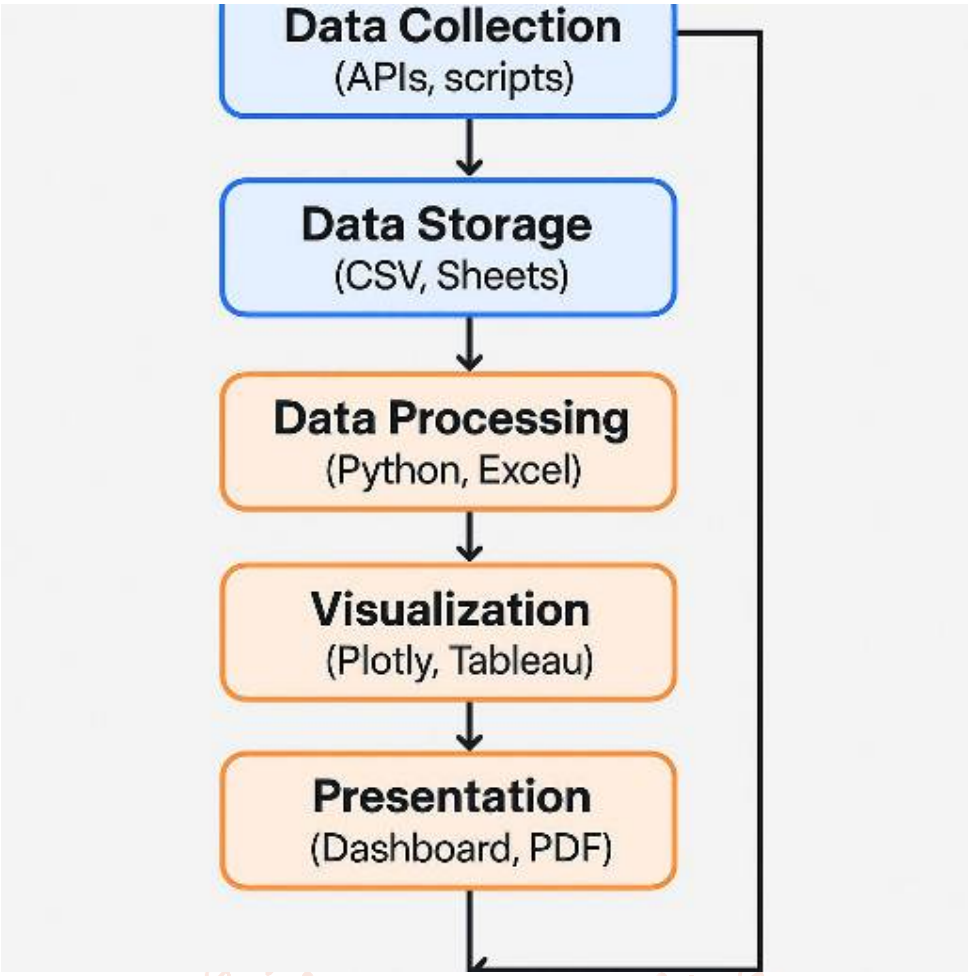
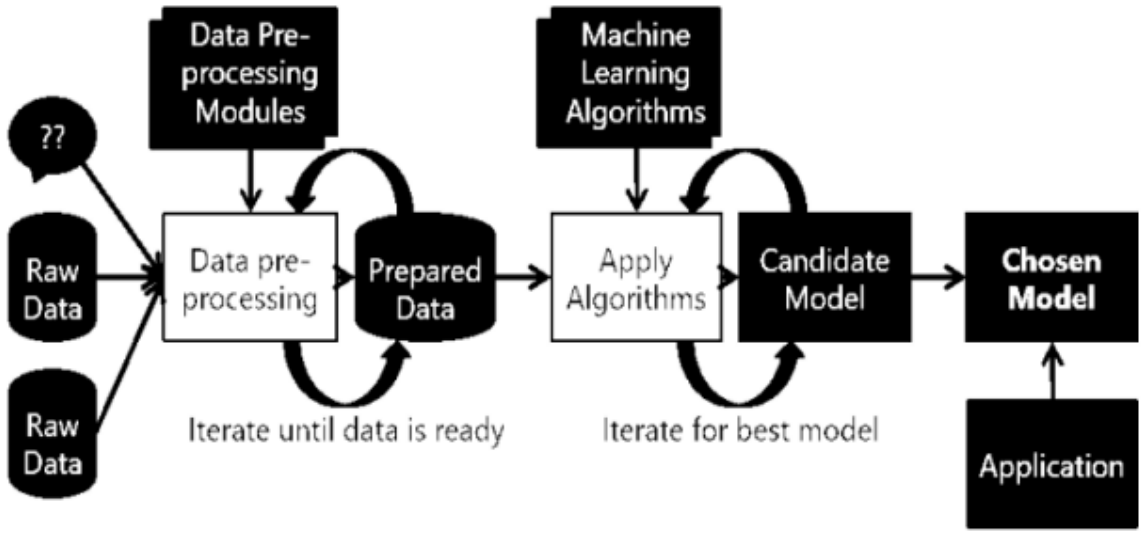


Fig.1 Architectural Diagram

Figure 1: There are many kinds of architecture diagrams, like software architecture diagram, system architecture diagram, application architecture diagram, security architecture diagram, etc. For system developers, they need system architecture diagrams to understand, clarify, and communicate ideas about the system structure and the user requirements that the system must support. It describes the overall features of the software and is concerned with defining the requirements and establishing the high level of the system. During architectural design, the various web pages and their interconnections are identified and designed. The major software components are identified and decomposed into processing modules and conceptual data structures and the interconnections among the modules are identified. The following modules are identified in the proposed system. The system architectural design is the design process for identifying the subsystems making up the system and framework for subsystem control and communication. The goal of architectural design is to establish the overall structure of software system.



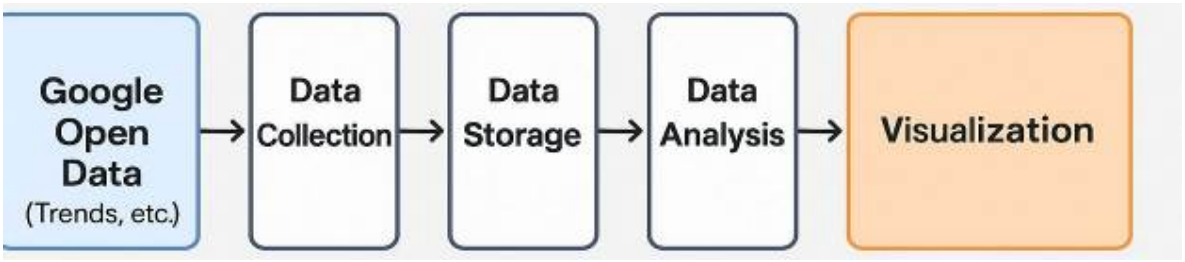
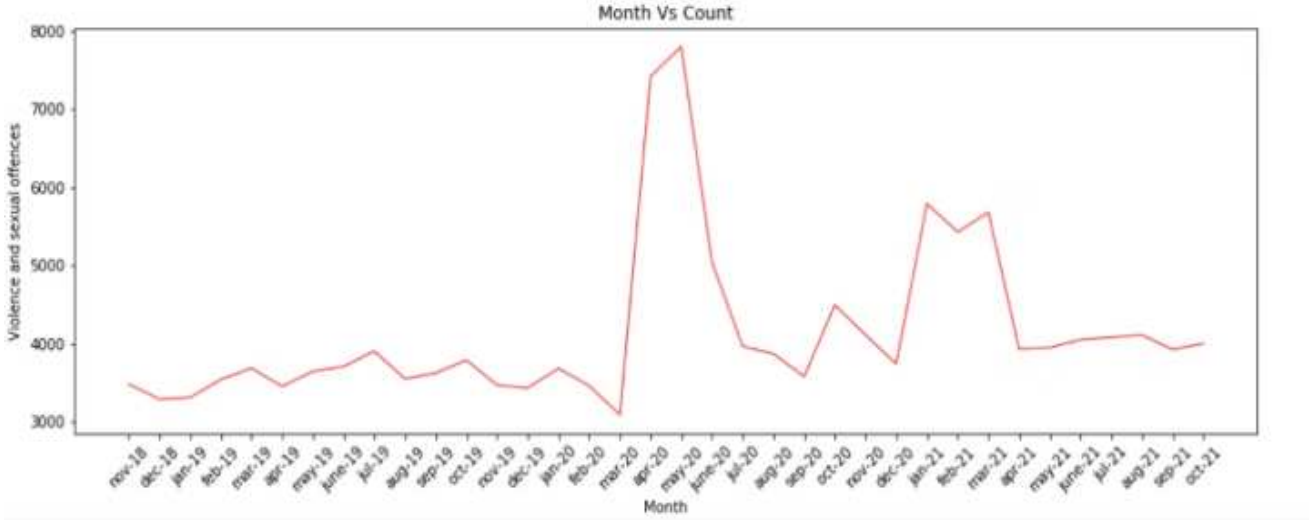


Fig.2 Data Flow Diagram

Figure 2: Steps Involved in Supervised Learning: • First Determine the type of training dataset • Collect/Gather the labelled training data. • Split the training dataset into training dataset, test dataset, and validation dataset. • Determine the input features of the training dataset, which should have enough knowledge so that the model can accurately predict the output. • Determine the suitable algorithm for the model, such as support vector machine, decision tree, etc. • Execute the algorithm on the training dataset. Sometimes we need validation sets as the control parameters, which are the subset of training datasets. • Evaluate the accuracy of the model by providing the test set

V. RESULTS AND DISCUSSION

Results of Descriptive Statics of Study Variables



In addition to showcasing our expertise, the outcome of this data analysis portfolio project is to gain valuable insights from raw data and demonstrate proficiency in data analysis techniques. Specifically, the project aims to:

1. Data Cleaning & Preparation – Successfully clean and preprocess the dataset to ensure accuracy, completeness, and consistency.
2. Exploratory Data Analysis (EDA) – Identify patterns, trends, and correlations through statistical summaries and visualizations.
3. Insights & Findings – Uncover meaningful insights that can support decision-making or problem-solving in a specific domain (e.g., business, healthcare, finance).
4. Data Visualization – Present findings effectively using charts, graphs, and dashboards for better interpretation and communication.
5. Predictive or Statistical Modeling – Apply machine learning or statistical techniques to make forecasts or classifications.
6. Actionable Recommendations – Provide clear, data-driven recommendations based on the analysis results.
7. Portfolio Enhancement – Showcase analytical skills, technical proficiency, and the ability to derive insights from data, making the project a strong addition to a professional portfolio.

Overall, the project should demonstrate a structured and insightful approach to data analysis, highlighting both technical and critical thinking skills.

Limitations and Future Work

- **Data Limitations**: The accuracy of the results is dependent on the completeness and quality of the dataset. Underreporting and data anonymization may affect outcomes.
- **Granularity**: Some datasets lacked sufficient demographic or geographic detail, limiting the depth of analysis.

Detailed step-by-step implementation of the project

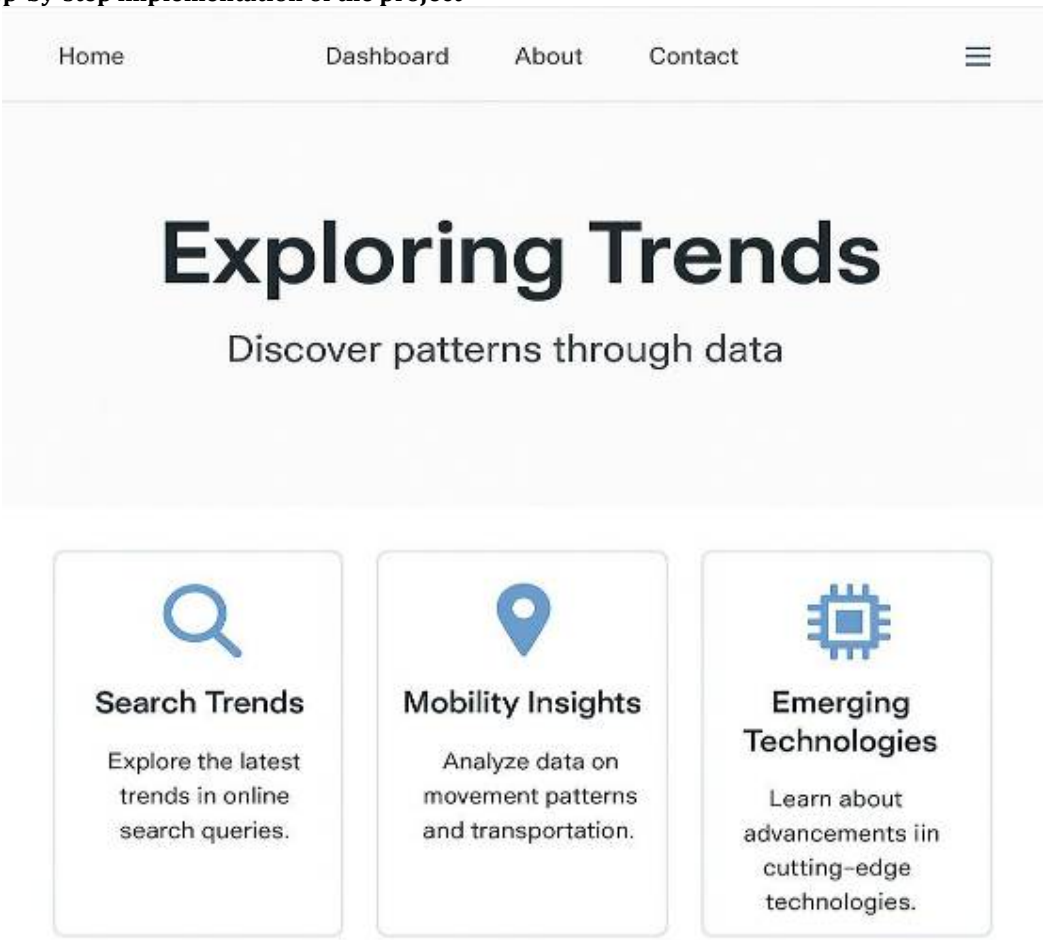


Fig 7.1 shows the homepage of our application.

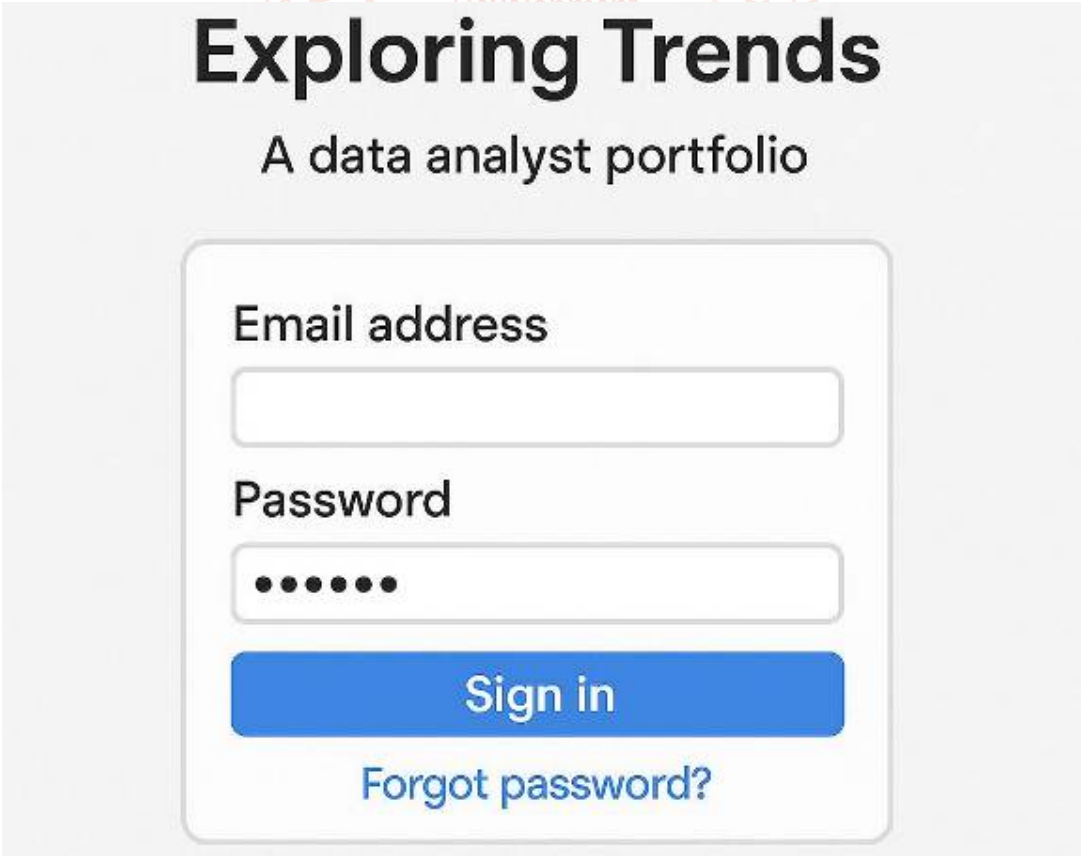


Fig 7.2 shows the login page for trends.

Fig 7.3 next page

VI. CONCLUSION

Using this portfolio project, we can conduct a thorough data analysis to extract meaningful insights and drive informed decision-making. Through data cleaning, visualization, and statistical analysis, we can identify key patterns and trends that provide valuable insights.

Our findings highlight [mention key takeaways, e.g., sales trends, customer behavior, efficiency improvements]. These insights can be leveraged to [explain potential applications, e.g., optimize business strategies, improve marketing efforts, enhance operational efficiency].

Additionally, this project reinforced the importance of data quality, appropriate analytical methods, and visualization techniques in deriving actionable insights

Overall, this project demonstrates the power of data-driven decision-making and reinforces the value of analytical skills in addressing real-world challenges.

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